



Status and Trends Monitoring for Watershed Health & Salmon Recovery (WHSR)

Glenn Merritt, Washington Department of Ecology

Importance

The Clean Water Act requires States to monitor the chemical, physical and biological integrity of rivers and streams. Federal guidelines for delisting under *The Endangered Species Act* require habitat assessment (including chemical and physical parameters). Therefore Washington State established the program called *Status and Trends Monitoring for Watershed Health and Salmon Recovery* ([WHSR](#)) for gathering consistent and integrated information about regional watershed health at multiple regional scales from statewide, down. The WHSR field [data collection protocols](#) include the following components:

- in-stream and riparian physical surveys,
- measurement of in-stream water quality parameters,
- sediment chemistry sampling for hydrocarbons and metals,
- vertebrate assemblage sampling, and
- macroinvertebrate assemblage sampling

WHSR monitoring mostly uses a set of probabilistic "[Washington Master Sample](#)" sites, which were selected using a *Generalized Random Tessellation Stratified* ([GRTS](#)) spatially-balanced survey design. Sampling among probabilistic sites is limited to freshwater, perennial, rivers and streams. Other selection criteria are defined in the [field protocols](#). The state is divided into eight [Status and Trends](#)

[Regions](#). We sample approximately 50 sites within each of seven STRs every four years. Results from this monitoring program will help Washington policymakers to prioritize strategies for protection of the chemical, physical and biological integrity of Washington's rivers and streams.

Additionally, annual monitoring among a set of 16 hand-selected "sentinel sites" helps to provide trend information for influences that are not localized. Sentinel sites are located in areas where we expect minimal changes in land uses and where we expect minimal local impacts from human activities. We sample two sentinel sites in each of the eight STRs. Results will assist in the interpretation of data from the randomized survey. Laughingwater Creek (Figure 1) serves as one of two sites in the Lower Columbia STR.

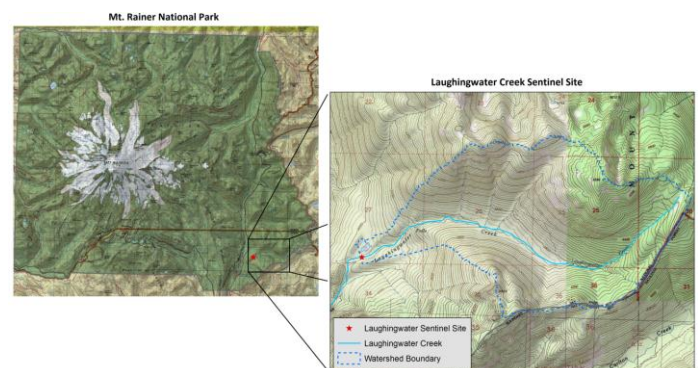


Figure 1: Location of Laughingwater Creek Sentinel Site within Mt. Rainier National Park.

Status of the research

Three hundred sixty-six (366) probabilistic sites have been sampled across Washington State since 2009. We have published a status [report for the Puget Sound STR](#).

Sentinel sites have been sampled according to the schedule in Table 1; we plan to continue annual sampling.

Table 1. Sentinel sites sampled by year, since 2009.

STR	Stream	Location ID	2009	2010	2011	2012
Puget Sound	Griffin Creek	SEN06600-GRIF09	X	X	X	X
Puget Sound	Hamma Hamma River	SEN06600-HAMM03	X	X	X	X
Coastal	Twin Creek	SEN06600-TWIN02		X	X	X
Coastal	Ellsworth Creek	SEN06600-ELLS01		X	X	X
Lower Columbia	Laughingwater Creek	SEN06600-LAUG07		X	X	X
Lower Columbia	Trapper Creek	SEN06600-TRAP08		X	X	X
Mid Columbia	Umtanum Creek	SEN06600-UMTA18			X	X
Mid Columbia	Cle Elum River	SEN06600-CLEE12			X	X
Snake River	Asotin Creek, N. Fk	SEN06600-ASOT13			X	X
Snake River	Panjab Creek	SEN06600-PANJ11			X	X
Northeast WA	Sullivan Creek	SEN06600-SULL20				X
Northeast WA	Deadman Creek	SEN06600-DEAD19				X
Upper Columbia	Marble Creek	SEN06600-MARB21				X
Upper Coilumbia	Poorman Creek	SEN06600-POOR22				X
Unlisted	Little Pend Oreille River	SEN06600-LITT06		X	X	X
Unlisted	Twentyfive Mile Creek	SEN06600-TWEN05		X	X	X

Raw data are available to the public through [STREAM database searches](#). These raw data are used to calculate numerous metrics. A preliminary set of metrics is available on STREAM now. We are still building more metrics, with a large roll-out expected during fall 2013. The bulk of our recent efforts have involved development and management of the database.

We also have collected summertime water temperature data (30-minute intervals) among sentinel sites. We plan to develop these data into metrics.

Results

We sampled Laughingwater Creek in the summers of 2010, 2011, and 2012 (Table 1). To put the data into context we will need to

compare them to other data from the project. Once the full set of metrics is built into the STREAM database we will be more adequately equipped to analyze them.